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REMARKS

This amendment is responsive to the Office Action of September 5, 2003. Reconsideration and allowance of claims 1-17 are requested.

Claims 1-3 and 5-8 stand rejected under 35 U.S.C. § 112, second paragraph.

Claim 4 was indicated as containing allowable subject matter.

Claims 9-17 stand rejected under 35 U.S.C. § 112, first paragraph.

The Present Application

In crossflow filtering, a feed liquid, such as thermally sterilized water, flows over one (or more) surfaces of a filter. The filter has a pore size which is sized to permit a permeate liquid, such as water, to pass through while preventing particulates within the feed liquid which are larger than the pore size from passing through the filter. In this manner, a filtered permeate liquid is formed, which is often the product liquid. Particulates build in the feed water becoming more concentrated. With a filter of less than infinite size, a seal is placed at the end of the filter to keep the feed liquid and the permeate liquid from intermixing, which would effectively negate the filtering operation.

As illustrated in acknowledged prior art FIGURES 1-2, filter disks 3 are slid over and stacked around a permeate discharge line 5. O-rings 7 are disposed between each of the filter disks, more specifically between inner annular sections of the filter disk that are coated to become impermeable, to prevent the feed water from reaching the interface between the filter disks and the perforated tube 5 of the permeate discharge channel 6. Conversely, this seal prevents the permeate liquid which can escape between the inner edge of the filter disk and the tube 5 from mixing with the feed liquid. It should be noted that the filter disks are not inherently sealed to the tube 5. Rather, that is the function of the O-ring 7.

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In the embodiment of FIGURES 4-5, the present application proposes to replace the single O-ring with an inner O-ring or seal 10 and an outer O-ring or seal 9. These two concentric O-rings define an intermediate space 12 in between. The intermediate spaces are connected with openings 11. In this manner, if the outer seal 9 fails and feed water enters the intermediate space, or if the inner seal fails and permeate liquid passes the inner O-ring 10 enters the intermediate space 12, then the presence of liquid within the intermediate space, or more specifically dripping from the lowermost opening 11, is indicative of a seal failure. Moreover, by sensing whether the dripping liquid is the feed liquid or the permeate liquid, one can determine which of the seals failed.

Similarly, in FIGURE 6, the filter element 15 has an upper end surface sealed by an impermeable layer 24. As the feed liquid flows through channel 20, permeate liquid passes through the filter, passing out of the filter on the right side of FIGURE 6 as illustrated by the arrows. A seal system 17 has one surface in contact with the feed liquid and another surface in contact with the permeate liquid. These two seal portions are sealed between the housing 16 and the impermeable surface 24 of the filter, and define an intermediate space 22 therebetween. If either feed liquid or permeate liquid breaches either the permeate side of the seal or the feed liquid side of the seal, the liquid will fill the intermediate space 22 and flow out via channel 23. Dripping from channel 23 is indicative of seal failure.

In the embodiment of FIGURE 7, the seal system 29 is an annular disk with an upper sealing portion which seals between the impermeable annular surface 30 and the housing 27 on the feed side, and another or lower sealing portion which seals between the filter impermeable surface 30 and the housing 27 on the permeate liquid side. Between these two sealing portions, an intermediate space 31 is defined. The intermediate space 31 communicates with a channel 32, the discharge of liquid from which is indicative of a failing seal.

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The Claims are Now in Condition for Allowance

Claim 1 has been amended to recite in detail how the gasket or gasket system defines the internal intermediate space. Accordingly, it is submitted that claim 1 and claims 2-3 dependent therefrom meet the statutory requirements for patentability.

Claim 4, which was indicated as containing allowable subject matter, has been placed in independent form.

Claim 5 has been placed in independent form and amended to claim the relationship among the gasket surfaces and how they define an internal intermediate space. Accordingly, it is submitted that claim 5 now complies fully with the requirements of 35 U.S.C. § 112.

Claim 6 has also been amended to specify how the gasket system defines the internal intermediate space. With this amendment, it is submitted that claim 6 and claims 7-8 dependent therefrom now comply fully with the requirements of 35 U.S.C. § 112.

Claim 9 finds full and complete antecedent basis in the application as filed. Looking first to the embodiment of FIGURES 4-5, the at least one filter element finds antecedent basis in the filter disks. Feed liquid flows over the outer radial portions and a permeate liquid is discharged at the inner vertical surface adjacent the central permeate discharge tube. The seal assembly includes a first seal 9 which is fluid communication with the feed liquid and a second seal portion 10 which is in fluid communication with the permeate fluid. An intermediate space 12 is defined between the two seal portions.

In the embodiment of FIGURE 6, the first seal portion finds antecedent basis in the portion of the seal 17 closest to the feed liquid channel 20. The second seal portion finds antecedent basis in the portion of the seal illustrated in the cross-section of FIGURE 6 at the far right, abutting the permeate fluid flow. In between these two seal portions, an intermediate space 22 is defined.

In the embodiment of FIGURE 7, the seal assembly finds antecedent basis in the annular seal 29 which extends

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around the upper portion of the tubular filter element 26. This seal defines an intermediate space 31 in communication with a discharge channel 32. A first portion of the seal disposed above the intermediate space in FIGURE 7 is in fluid communication with the feed liquid. The second seal portion below the intermediate space in FIGURE 7 is in fluid communication with the permeate liquid that flows as shown by the arrows between the outer surface of the filter and the housing wall 27.

Accordingly, it is submitted that claim 9 finds full and complete antecedent basis in the application as filed and is generic to all embodiments. Dependent claims 10-14 focus more specifically on the various embodiments and are also supported by the specification. Accordingly, it is submitted that claims 10-14 meet the statutory conditions for patentability.

Claim 15 is fully supported by the specification and is generic to all three illustrated embodiments. In the embodiment of FIGURE 5, a first seal 9 seals the feed liquid from an intermediate space 12 and a second seal 10 seals the permeate liquid from the intermediate space. In the embodiment of claim 6, the portion of seal assembly 17 adjacent the central feed tube 20 seals the feed liquid from the intermediate space 22 and a portion of seal assembly 17 at the far right of FIGURE 6 adjacent the permeate liquid flow in the region between the filter and housing wall 21 separates the permeate liquid from the intermediate space 22. In FIGURE 7, the upper portion of seal assembly 29 seals the intermediate space 31 from the feed liquid and the lower portion of seal 29 seals the intermediate space 31 from the permeate liquid in the annular region between the filter and housing wall 27. Accordingly, it is submitted that claim 15 finds full and complete antecedent basis in the specification and drawings as filed.

Accordingly, it is submitted that all claims comply fully with the requirements of 35 U.S.C. § 112. There being no

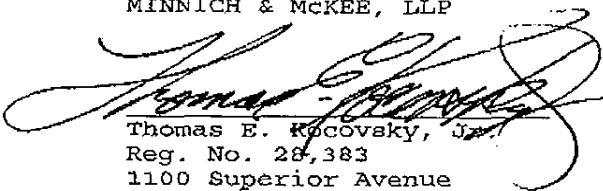
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rejection based on art, it is submitted that all claims are now in condition for allowance.

An early allowance of all claims is requested.

Respectfully submitted,

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CERTIFICATE OF FAXING

I hereby certify that this **AMENDMENT B** in connection with U.S. Patent Application Serial No. 10/030,738 is being transmitted by telefacsimile to the U.S. Patent and Trademark Office, Attention Examiner KIM at Telefacsimile No. (703) 872-9306 on this 5th day of December, 2003.

By: Hilary McNulty

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